

NASA GRC CRYOGENIC SEAL TEST RIG CAPABILITY

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NASA GRC Cryogenic Seal Test Rig Capability

Presented by
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Cryogenic Seal Test Rigs at NASA GRC



1. LO_x Seal Test Rig

Designed and built by Mechanical Technology Inc.
under NASA Contract NAS3-23260 to test seals
for liquid oxygen turbopumps.

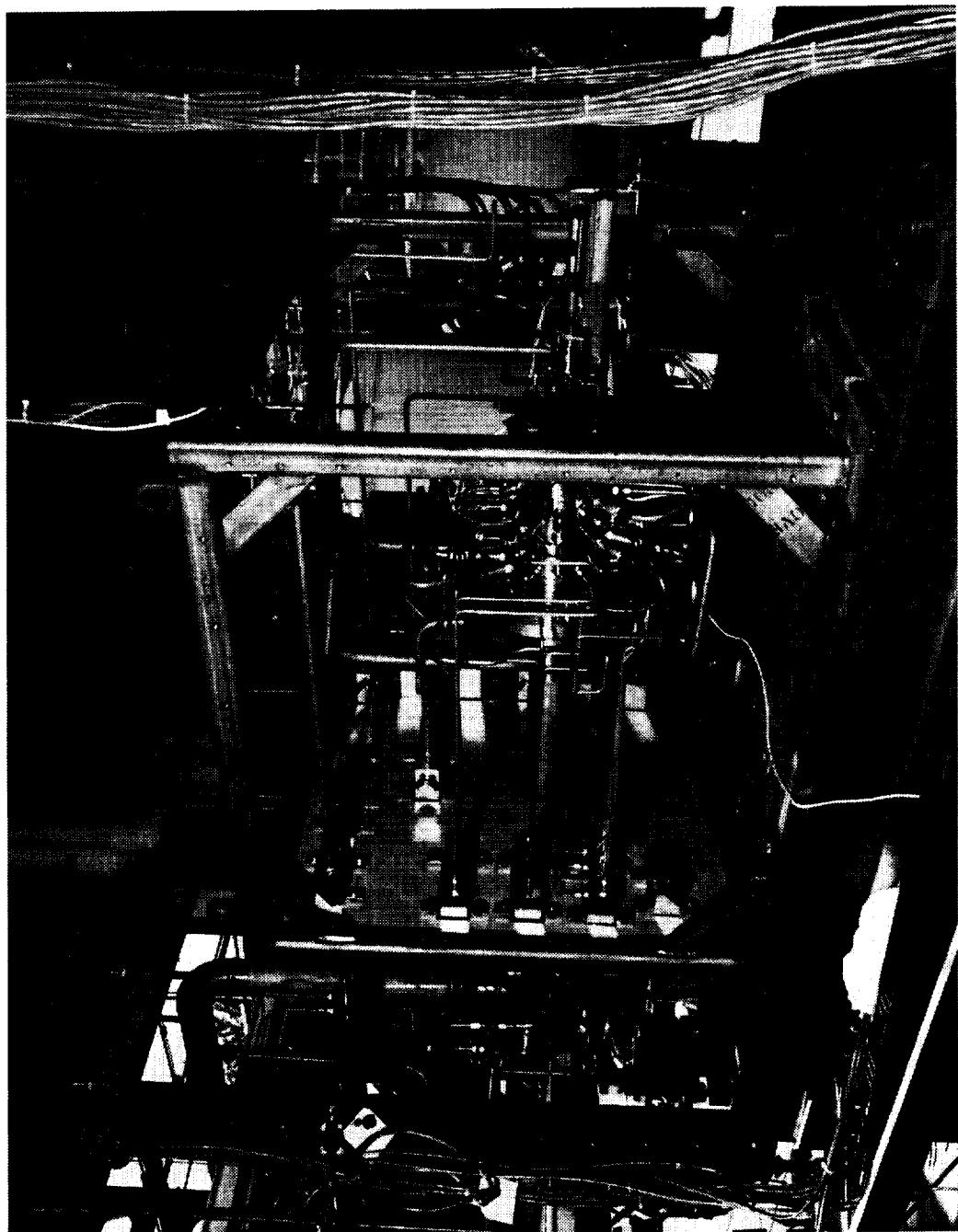
2. Cryogenic Brush Seal Test Rig

- Originally designed and built by Rocketdyne under NASA Contract to test low thrust pumps.
- Modified by NASA to test brush seals in LN₂ and LH₂.



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LO_x Seal Test Rig



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LO_x Seal Test Rig Capabilities



- 50-mm and 20-mm seal hardware
- Face Seal or Ring Seals
- 750 psi LN₂ or LO_X seal supply
- 200 psi GHe seal supply
- 100,000 rpm maximum shaft speed (depending on seal)
 - 100 Hp GN₂ turbine drive, overhung, radial in-flow
- Axial vibration can be imposed via thrust bearing control



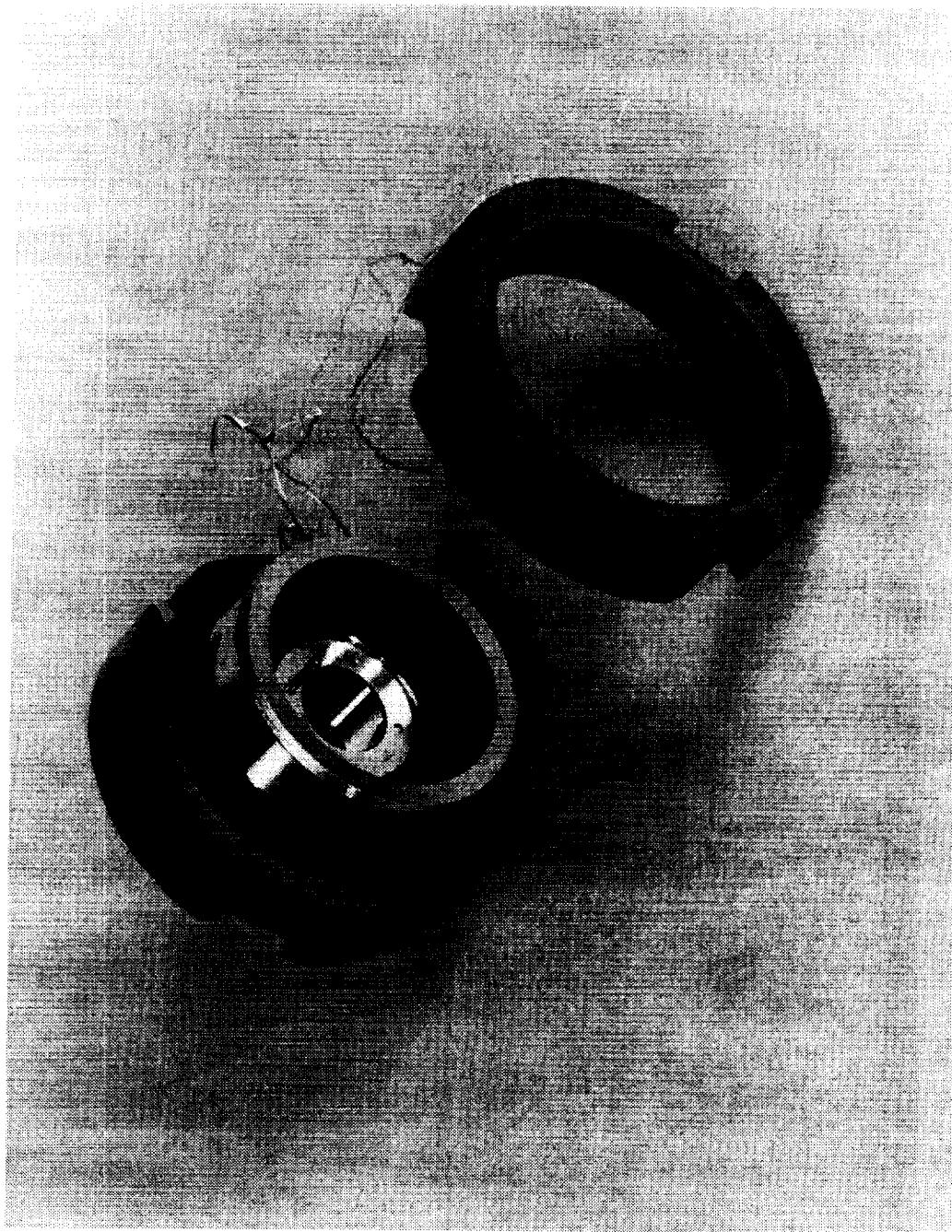
LO_x Spiral Groove Face Seal



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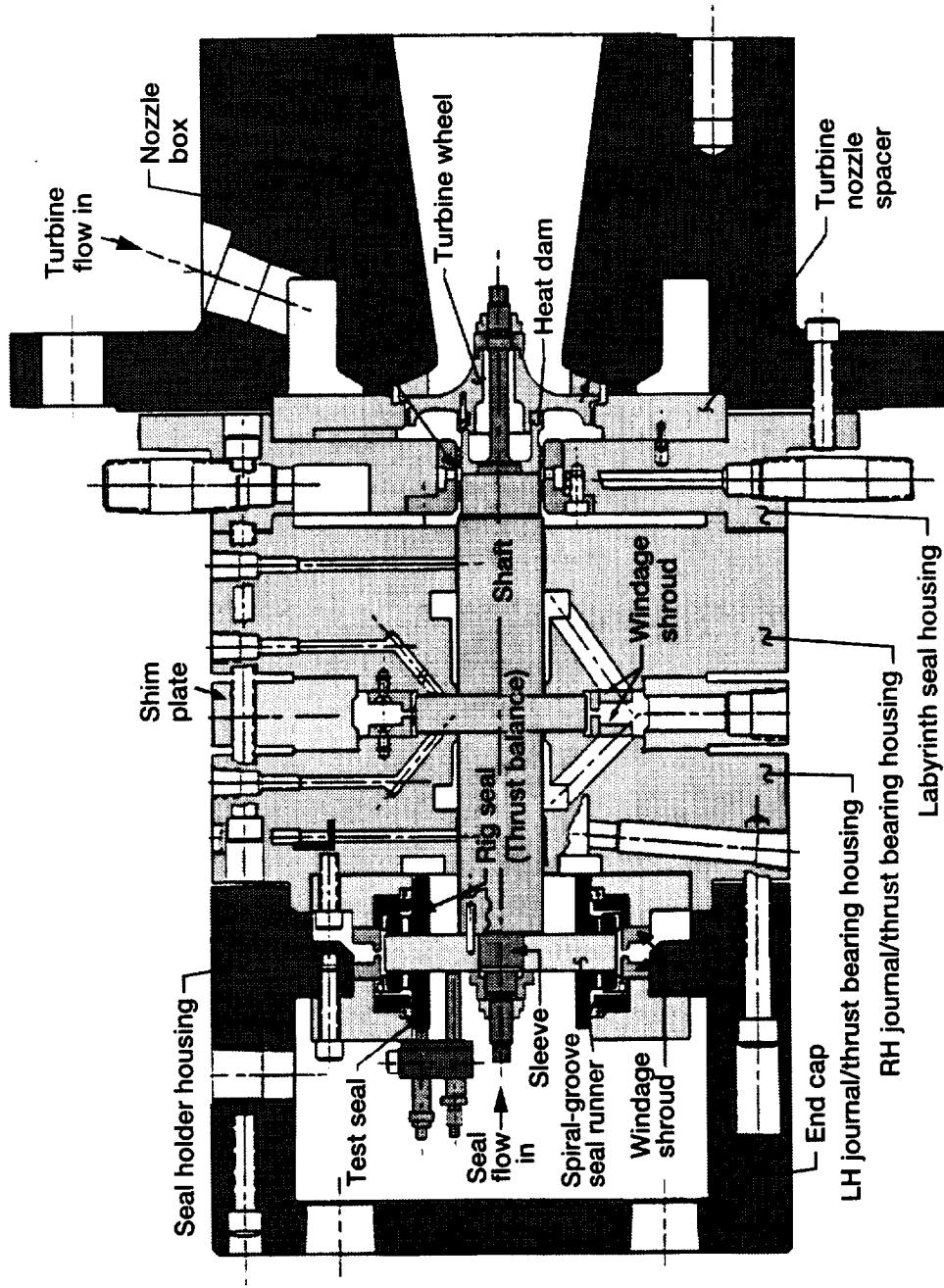
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Raleigh-Step Helium Buffer Seal



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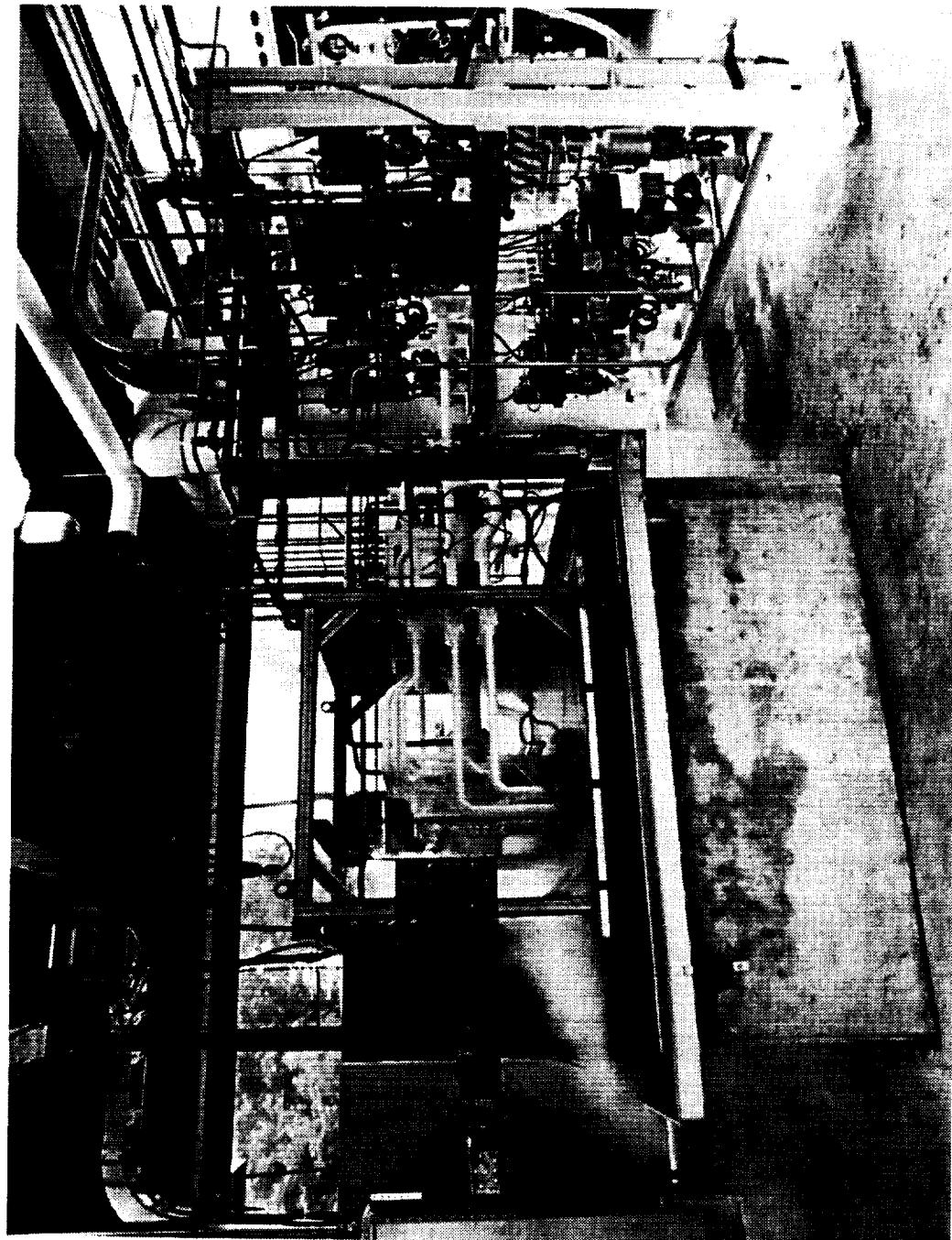
LO_x Seal Test Rig



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LO_x Seal Test Rig During Test



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Cryogenic Brush Seal Test Rig Capabilities

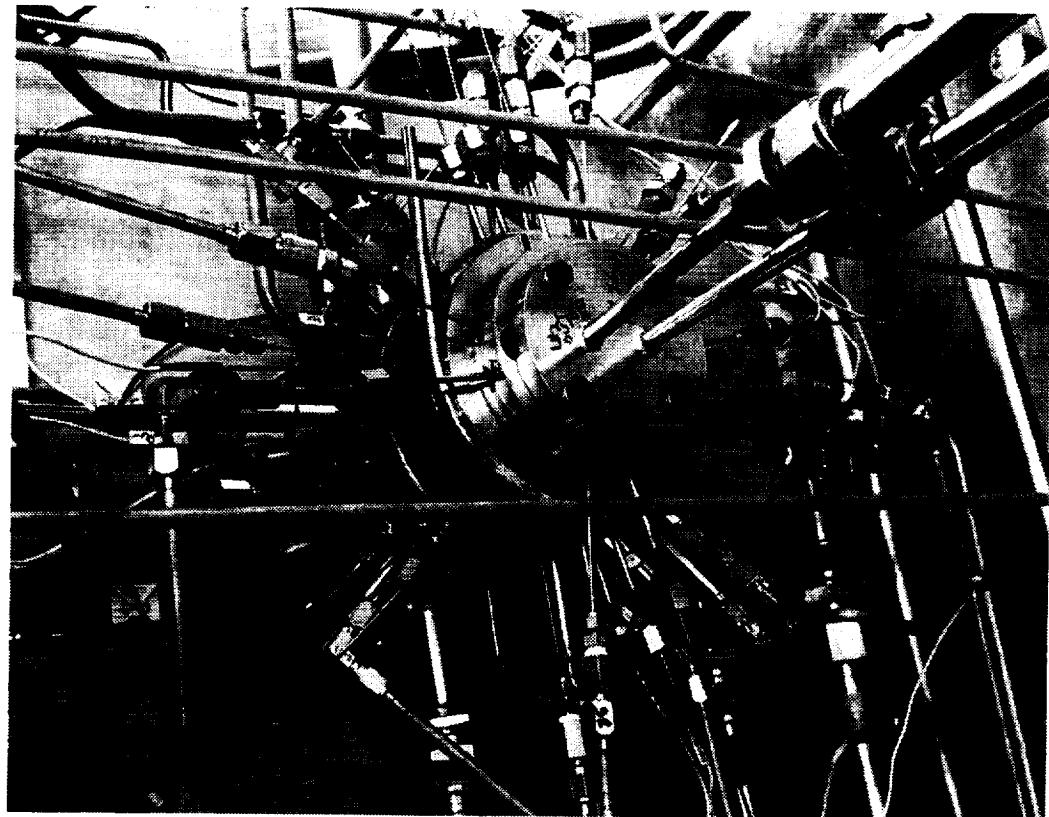


- 2 inch diameter bore seals
- 5 brushes at one time - use long, low speed runner maximum speed 40,000 rpm
- 1 brush at a time - use short, high speed runner maximum speed 65,000 rpm
- 800 psig MAWP of rig
- Maximum Delta-P across seal is 300 psi due to balance piston capability
- LH₂ or LN₂
- 14 seal temperature measurement locations
- 14 seal pressure measurement locations
- 3 proximity probes measure rotor orbit



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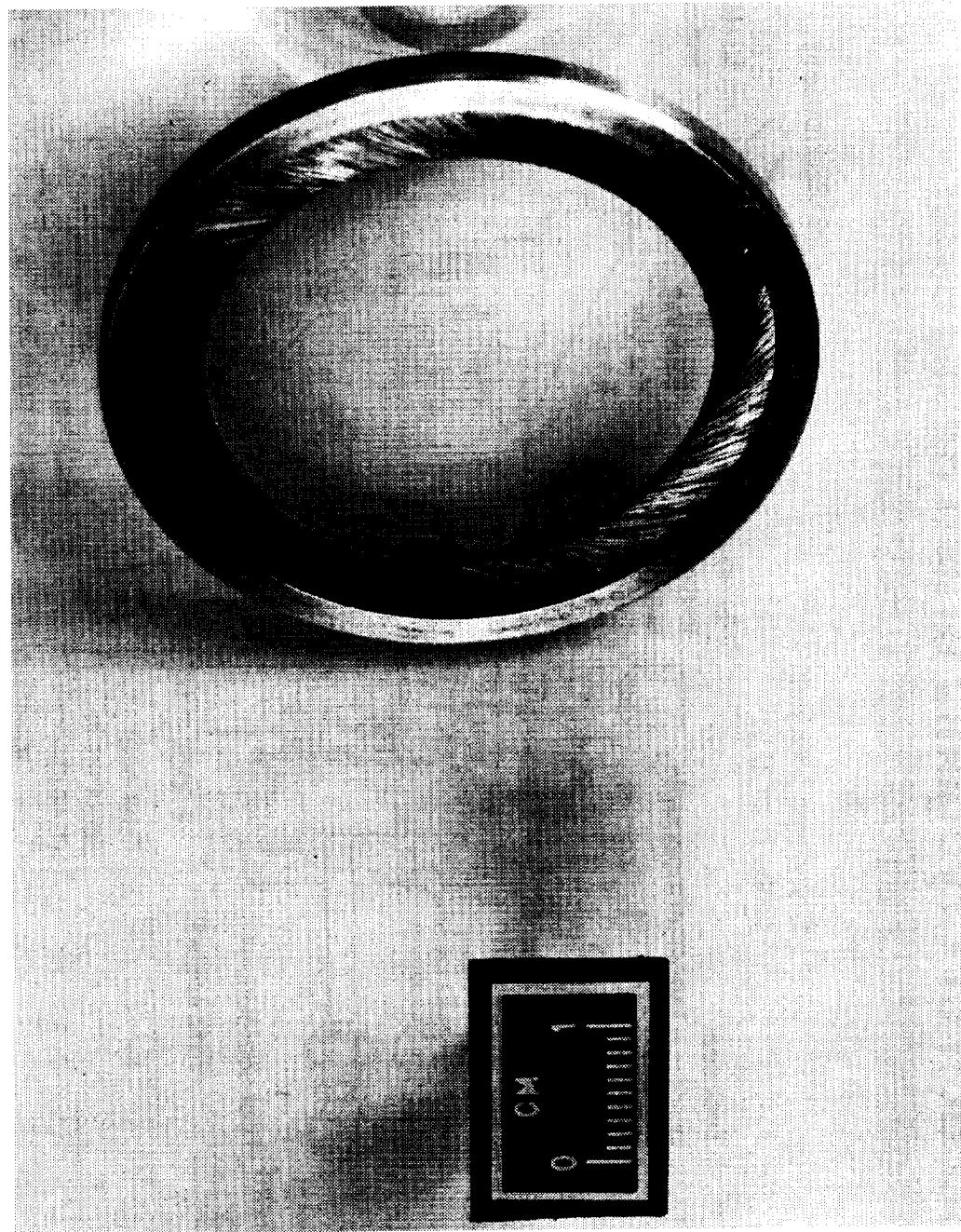
Cryogenic Brush Seal Tester Installation



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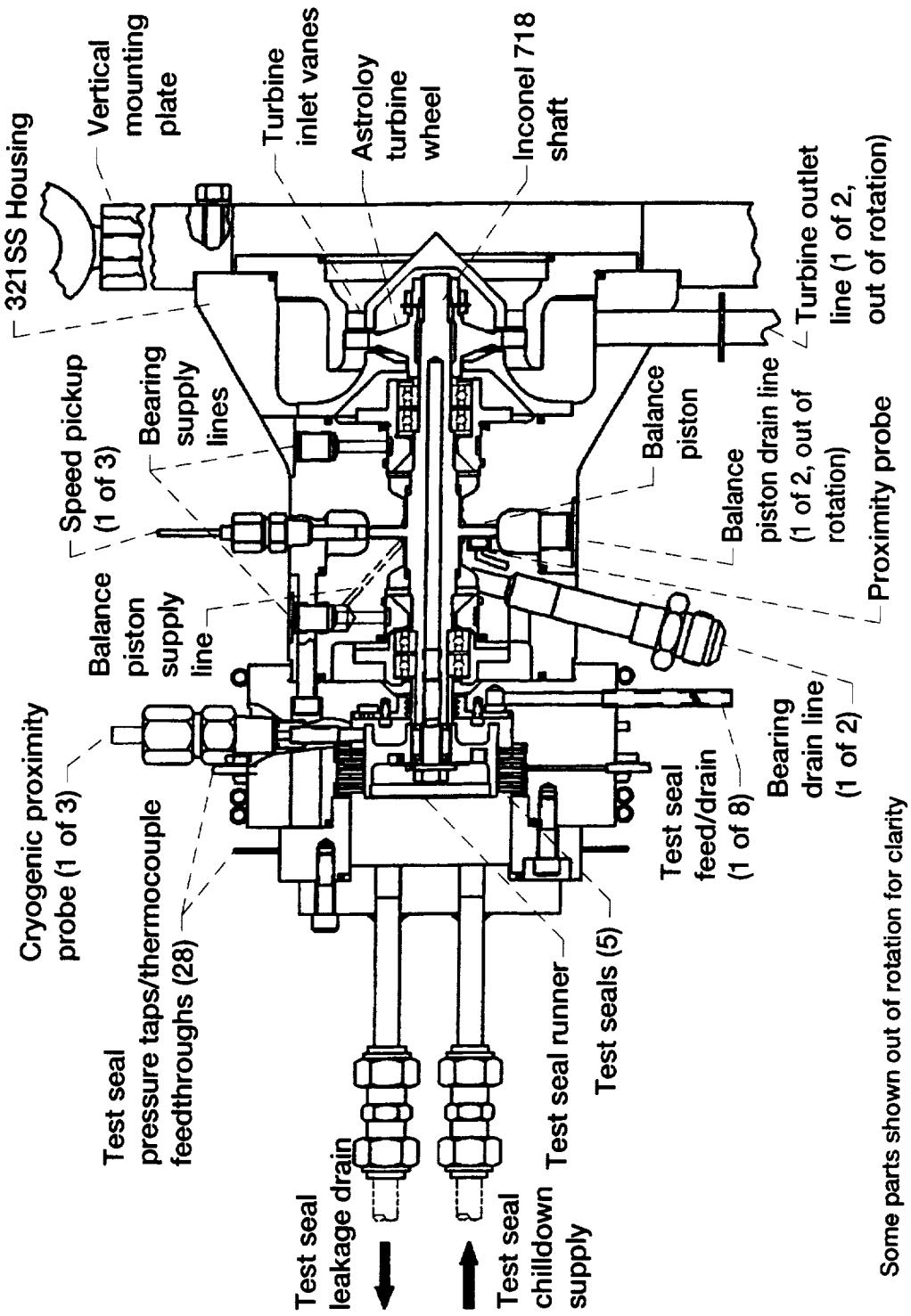


Typical Brush Seal



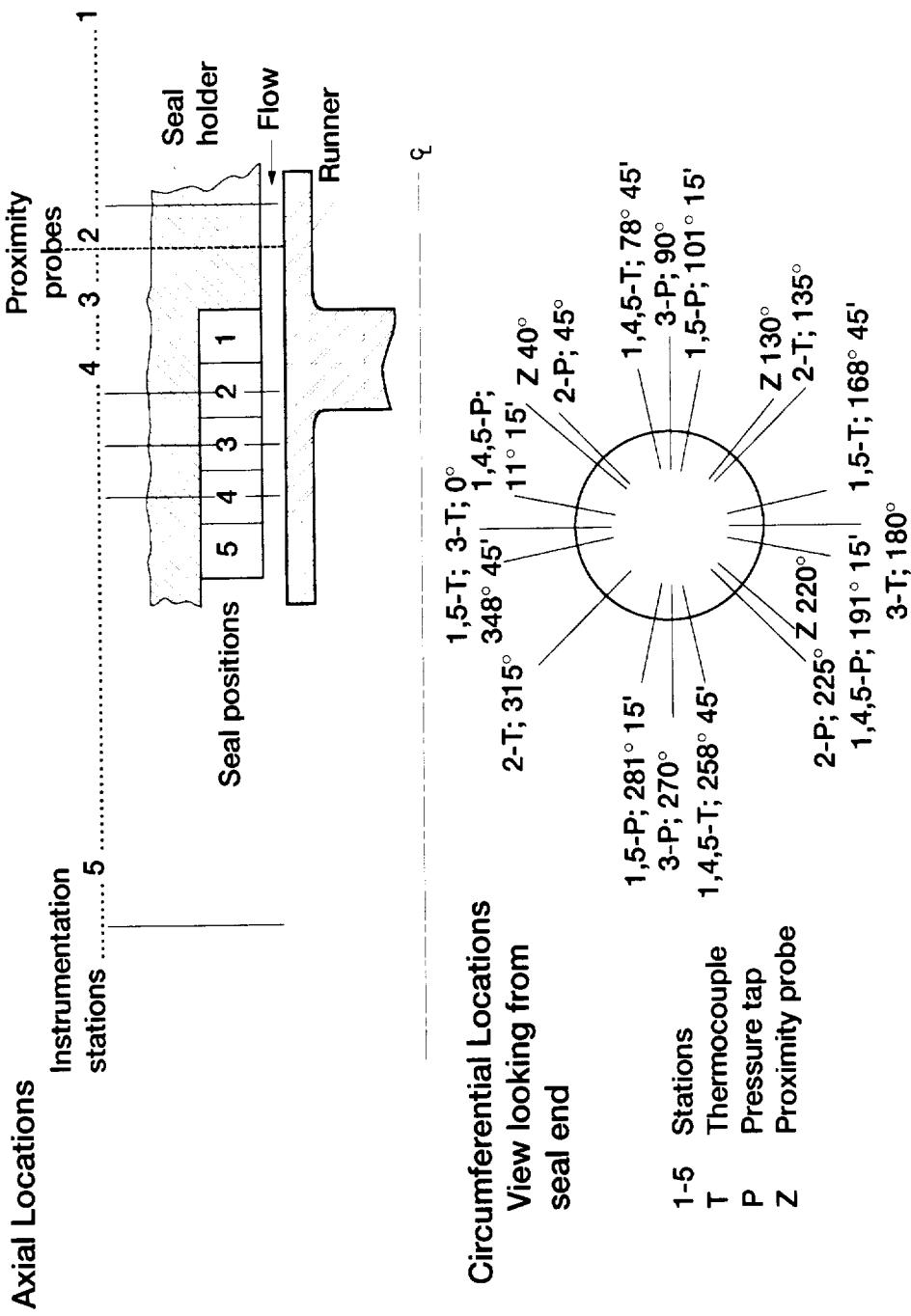
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Cross Section of Cryogenic Brush Seal Tester

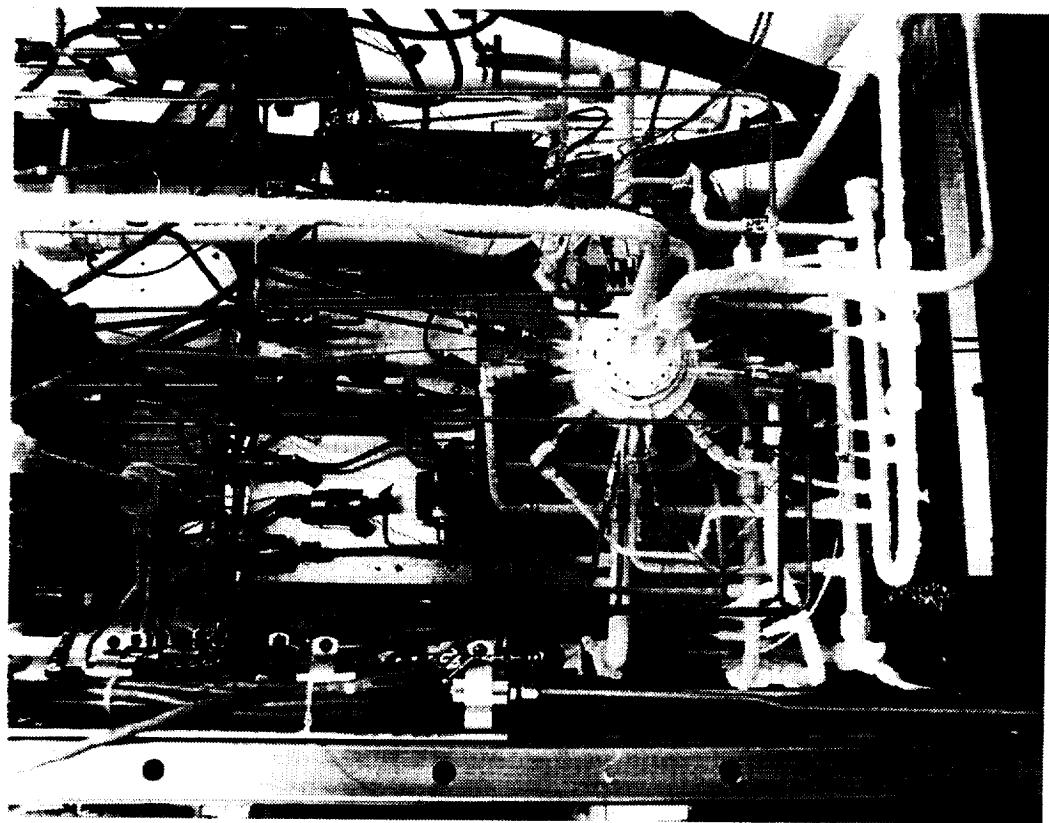
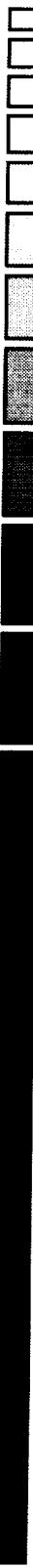


Location of Brush Seal Positions and Instrumentation Stations

Low-Speed Runner Shown



Cryogenic Brush Seal Tester During Test



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